

# Tenth Young Researchers' Conference Materials Science and Engineering

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## **Program and the Book of Abstracts**

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**Characterisation of bronze surface coatings on titanium formed by plasma electrolytic oxidation in 12-tungstosilicic acid**

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The growth of silicate tungsten bronzes on titanium by plasma electrolytic oxidation (PEO) in 12-tungstosilicic acid was experimentally investigated. Oxide coatings were characterized by AFM, SEM-EDS and XRD. It was confirmed that oxide coating morphology is strongly dependent on PEO time, density of discharge channels decreases while their diameter increases resulting in increased roughness of oxide coatings. The elemental components of PEO coatings are Ti, W and O. Oxide coatings are partly crystallized and mainly composed of WO<sub>3</sub> and TiO<sub>2</sub>. Raman spectroscopy showed that the outer layer of oxide coatings is silicate tungsten bronzes.

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**Influence of thermal treatment on structural, morphological and optical characteristics of upconvertors**

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The upconverting phosphors are materials of great interest for optoelectronics operating in the near infrared region. The preparation of highly spherical Y<sub>2</sub>O<sub>3</sub>:Yb,Er particles are synthesized *via* spray pyrolysis from common nitrate solution with fixed dopants ratio of Yb/Er=10. The processing conditions are as follows: precursor concentration 0.1M, atomization frequency 1.3 MHz, temperature regime 200-900-900°C and air flow rate 1,6 dm<sup>3</sup>/min. The as-prepared particles collected in the electrostatic precipitator are additionally thermally treated at 1100 °C for 12, 24 and 48 hours. Detailed structural analyses are performed by X-ray powder diffraction (XRPD) based on which the structural refinement is done using Topas Academic Software. The results imply that with the increase of calcination time crystallite size increasing along with microstrain diminishing. The particle morphological characteristics are studied by scanning electron microscopy (SEM) and are further correlated with specific surface area (BET), size distribution (LPS) and optical properties followed through photoluminescence measurements (PL).